Memo

THE CADMUS GROUP, INC.

To: Kevin Brannan, ODEQ; Jayne Carlin, EPA; Helen Rueda, EPA; Jennifer Wu, EPA

From: Laura Blake, The Cadmus Group, Inc.

Date: July 23, 2012

Re: Big Elk Creek HSPF Modeling – Updated Calibration and Uncertainty Analysis

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This memo summarizes differences between calibration and uncertainty analysis results using original and updated calibration criteria for Big Elk Creek HSPF modeling. Updated criteria considered baseflow index rather than baseflow volume for PEST calibration. Note that tables/figures referenced below are found in the final modeling report.

Calibration

- Revised calibration criteria resulted in increased groundwater outflow and decreased overland flow/interflow from pervious land segments (Table 9).
- The increase in groundwater outflow is an outcome of lower calibrated values of three parameters affecting groundwater discharge: DEEPFR, BASETP, and AGWETP (Table 12).
- Reductions in overland flow and interflow are mainly driven by higher calibrated values of infiltration parameters INFILT120 and INFILT210 and increased upper zone storage for pasture land segments (parameter UZSN200) (Table 12).
- Differences between flow statistics used for calibration criteria (e.g., total volume, summer volume, mean storm peak, etc.) and flow duration plots are minor (Table 8; Figure 10).

Uncertainty Analysis

- 110 of 500 randomly generated parameter sets provided Q5, Q10, Q25, Q50, and Q95 flows within StreamStats prediction intervals, versus 338 of 500 parameter sets in the original uncertainty analysis.
- 389 of the 390 rejected parameter sets had Q95 flows below the StreamStats minimum, indicating that the range of Q95 predictions shifted downwards with the revised calibration criteria (i.e., parameters sets consistently predict that low flow conditions are more frequent) (Figure 17). This corresponds to the increase in groundwater outflow and decrease in overland flow/interflow discussed above.
- Values of parameters DEEPFR and AGWETP in the retained parameter sets are less variable than in the original uncertainty analysis. The interquartile range (between the 25th percentile and 75th percentile) for both parameters is zero in the updated uncertainty analysis (Figure 14).

- The objective function is less variable than in the original uncertainty analysis. The objective function interquartile range in the revised analysis is 87 (versus 336 in the original analysis). Also note that in the updated analysis, the minimum objective function resulting from retained parameter sets is greater than the calibrated objective function (Figure 16).